

Listing of Claims

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Previously Presented) A semiconductor processing system comprising:

a variable volume chamber to provide gas consumed in a semiconductor process, wherein the variable volume chamber defines a variable interior volume and comprises a piston;

a precursor boat inside the variable volume chamber and configured to hold a liquid or a solid source of gas consumed in a semiconductor process;

a pressure detector to detect a parameter indicative of a pressure of gas inside the variable volume chamber and to produce an output indicative thereof; and

a pressure controller in communication with the pressure detector and the variable volume chamber, the pressure controller to apply a force to the variable volume chamber based on the output of the pressure detector and thereby vary the variable interior volume to regulate the pressure of the gas inside the variable volume chamber.

2. (Previously Presented) The system of claim 1, wherein the pressure controller comprises a constant pressure controller to keep the pressure of the gas inside the variable volume chamber substantially constant.

3. (Original) The system of claim 1, further including a processing chamber, and wherein the variable volume chamber is to provide a precursor material to the processing chamber.

4. (Original) The system of claim 3, wherein the precursor material is to react with another material in the processing chamber.

5. (Original) The system of claim 1, wherein the semiconductor process is a chemical vapor deposition process.

6. (Original) The system of claim 1, wherein the semiconductor process is an atomic layer deposition process.

7. (Canceled)

8. (Currently Amended) The system of claim 7, wherein the bellows variable volume chamber is included in a pressurization region.

9. (Original) The system of claim 8, wherein the pressure controller comprises a gas source to selectively communicate with the pressurization region.

10. (Previously Presented) The system of claim 9, wherein the gas source is to selectively communicate with the pressurization region when the pressure of the gas inside the pressurization region is below a desired pressure.

11. (Original) The system of claim 8, wherein the pressure controller comprises a vacuum source to selectively communicate with the pressurization region.

12. (Previously Presented) The system of claim 11, wherein the vacuum source is to selectively communicate with the pressurization region when the pressure of the gas inside the pressurization region is above a desired value.

13. (Canceled)

14. (Previously Presented) The system of claim 1, wherein the parameter indicative of the pressure is a force on the piston.

15. (Original) The system of claim 1, further including another variable volume chamber.

Claims 16.-22. (Canceled)

23. (Previously Presented) A chemical reactant delivery system comprising:

a variable volume chamber comprising a piston, having an outlet, and defining a variable interior volume, the outlet to deliver a reactant gas from an interior region of the variable volume chamber to a reaction chamber;

a precursor boat inside the variable volume chamber and configured to hold a liquid or a solid source of the reactant gas;

a pressure detector to detect a parameter indicative of a pressure of the reactant gas inside the variable volume chamber and to produce an output indicative thereof; and

a pressure controller in communication with the pressure detector and the variable volume chamber, the pressure controller to apply a force to the variable volume chamber based on the output of the pressure detector and thereby vary the variable interior volume to regulate the pressure of the reactant gas inside the variable volume chamber.

24. (Previously Presented) The system of claim 23, wherein the pressure controller comprises a constant pressure controller to keep the pressure of the reactant gas inside the variable volume chamber substantially constant.

25. (Canceled)

26. (Currently Amended) The system of claim 25, wherein the ~~bellows~~ variable volume chamber is included in a pressurization region.

27. (Original) The system of claim 26, wherein the pressure controller comprises a gas source to selectively communicate with the pressurization region.

28. (Original) The system of claim 26, wherein the pressure controller comprises a vacuum source to selectively communicate with the pressurization region.

29. (Canceled)

30. (Original) The system of claim 23, further including another variable volume chamber.

31. (Previously Presented) The semiconductor processing system of claim 1, wherein the pressure controller comprises a mechanically moveable member to apply the force to the variable volume chamber.

32. (Previously Presented) The chemical delivery system of claim 23, wherein the pressure controller comprises a mechanically moveable member to apply the force to the variable volume chamber.

33. (Previously Presented) The semiconductor processing system of claim 1, further comprising a temperature control device to control the temperature of the precursor boat.

34. (Previously Presented) The semiconductor processing system of claim 33, wherein the temperature control device comprises a heater in thermal communication with the precursor boat.

35. (Previously Presented) The semiconductor processing system of claim 33, wherein the temperature control device is to control the temperature of the precursor boat based on the output of the pressure detector.

36. (Previously Presented) The semiconductor processing system of claim 3, further comprising a thermal isolation region between the processing chamber and the variable volume chamber.

37. (Previously Presented) The chemical delivery system of claim 23, further comprising a temperature control device to control the temperature of the precursor boat.

38. (Previously Presented) The chemical delivery system of claim 37, wherein the temperature control device comprises a heater in thermal communication with the precursor boat.

39. (Previously Presented) The chemical delivery system of claim 37, wherein the temperature control device is to control the temperature of the precursor boat based on the output of the pressure detector.

40. (Previously Presented) The chemical delivery system of claim 23, further comprising a thermal isolation region between the reaction chamber and the variable volume chamber.

41. (Previously Presented) A semiconductor processing system comprising:

a variable volume chamber to provide gas consumed in a semiconductor process, wherein the variable volume chamber comprises a piston;

a precursor boat inside the variable volume chamber and configured to hold a liquid or a solid source of gas consumed in a semiconductor process;

a pressure detector to detect a parameter indicative of a pressure of gas inside the variable volume chamber and to produce an output indicative thereof; and

a pressure controller in communication with the pressure detector and the variable volume chamber, the pressure controller to apply a force to the piston based on the output of the pressure detector and thereby regulate the pressure of the gas inside the variable volume chamber.

42. (Currently Amended) The system of claim [[13]] 41, wherein the parameter indicative of the pressure is a force on the piston.

43. (Previously Presented) A chemical reactant delivery system comprising:

a variable volume chamber having an outlet and comprising a piston, the outlet to deliver a reactant gas from an interior region of the variable volume chamber to a reaction chamber;

a precursor boat inside the variable volume chamber and configured to hold a liquid or a solid source of the reactant gas;

a pressure detector to detect a parameter indicative of a pressure of the reactant gas inside the variable volume chamber and to produce an output indicative thereof; and

a pressure controller in communication with the pressure detector and the variable volume chamber, the pressure controller to apply a force to the piston based on the output of the pressure detector and thereby regulate the pressure of the reactant gas inside the variable volume chamber.